systems involved in the registration. It is quite improbable, for example, that the pressure of 90 pounds per square foot reported to have been indicated by the Osler's pressure gage at Bidston, Liverpool, March 9, 1871, was an accurate record of the force of the wind at that time and place.

Even at the present time there is a great deal of uncertainty not only as to the velocity of the wind in those cases where our instruments indicate velocities of from 50 to 100 miles per hour, but also as to the relations between velocity and pressure under these extreme conditions. This is owing to the difficulty and expense surrounding reliable experimental investigations of this problem, and also to the considerable discordance that exists between the results of the investigations that have been attempted.

The question was quite extensively studied in England by the Wind Force Committee of the Royal Meteorological Society, and numerous papers on the subject will be found in the "Quarterly Journal of the Royal Meteorological Society," since about 1888. Notes of exceptionally high wind pressures, as deduced from the results of the investigations referred to, will also be found in the recent numbers of "Symons's Meteorological Magazine."

In regard to the highest wind velocity records in the United States, it may be stated that records by the Weather Bureau type of Robinson anemometer used on Mount Washington, N. H., have frequently shown velocities ranging from 100 to 120 miles per hour. There is one doubtful record of a velocity of 186 miles per hour, but we have authentic records of 150 miles per hour. We have also a perfect record from our station at Point Reyes Light, Cal., of a long sustained velocity exceeding 90 miles per hour, with an extreme velocity of 120 miles per hour.[1] It must be confessed that we are unable to accurately interpret the indications of our anemometers at these very high velocities.

The size and inertia of the Robinson anemometer affect its records, and that too differently in gusts and in steady winds. The Weather Bureau pattern has been tested up to 60 miles per hour only, and the resulting table for converting recorded into true velocities is as follows:

Indicated velocity.	Correct velocity.
5	5.1
10	9.6
20	17.8
30	25.7
40	33.3
50	40.8
60	48.0
70	55.2
80	62.2
90	69.2

All velocities above the 60-mile limit must remain hypothetical until the apparatus has been properly standardized.

THE PHILIPPINE WEATHER BUREAU.

The Annual Report of the Director of the Philippine Weather Bureau for the year ending August 1, 1902, is addressed to the Hon. Dean C. Worcester, Secretary of the Interior, P. I., and was printed as Appendix P, pp. 663–677, of the Report of the Philippine Commission to the President of the United States. Although printed at Washington in 1902, this report reached the U. S. Weather Bureau, via Manila, only in July, 1903.

The publications of the Philippine Weather Bureau, so far as we have received them, may be classified as—

(*a*) The Annual Report of the Director to the Philippine Commission. Published in octavo as an official document of the United States Senate, at Washington, and also to be had as a separate from the Annual Report of the Bureau of Insular Affairs, under the Secretary of War.

[1] See Monthly Weather Review, February, 1903, pp. 64–68.

(*b*) A series of bulletins of information printed in Manila by the Bureau of Public Printing, on behalf of the Manila Central Observatory. This series is a continuation of an earlier series, alternately 8vo and 4to, dealing with seismology and the seismic service of the archipelago. The first five are in Spanish; the sixth is by the Assistant Director of the Philippine Weather Bureau, M. Saderra Masó, S. J., entitled: Report on the Seismic and Volcanic Centers of the Philippine Archipelago. Manila, 1902. The preface is dated September, 1901. This pamphlet of 26 pages, with several maps, gives an admirable summary of our knowledge of Philippine vulcanology. On page 20 is given a table showing the monthly frequency of earthquakes during eighteen years. Nine hundred and sixty-two shocks are recorded, being an average of fifty-three earthquake days for last year, or 4.5 per month. An earthquake day is the date of the main shock, and does not include the subsequent shocks. The maximum frequency occurred in 1881 and again in 1897 and the minimum in 1886. The annual variation is such that we apparently have a minimum in March, a maximum in February, and a principal maximum in September; but these annual and monthly maxima are not sufficiently well marked to justify the conclusion that they represent normal periodicities. They will probably be changed by increasing the number of observers and the number of years of record, and, especially, by the substitution of seismographs for personal observations. In this same series of bulletins of information we must include the publications bearing on terrestrial magnetism, which began with the magnetic observations at Paragua, Jolo, and Mindanao in the year 1888: this subject includes five pamphlets, the last one being, The Magnetic Dip and Declination in the Philippine Islands. In this series, also, we include the publications bearing on meteorology proper. These begin with the pamphlet by Father Faura, On the Cyclones of October 20 and November 5, 1882, and include twenty-five pamphlets, of which the latest is by Father Algué, Observations of Soil Temperatures at Manila, 1896–1902. One of the most elaborate papers in this series is the Climatologia de Filipinas, which is a large collection of data and maps, 265 pages and 64 plates, printed at Washington in 1900.

(*c*) The third class of publications includes the regular monthly and annual volumes of data published in quarto. This series begins with the monthly bulletin in Spanish from 1865 to 1901, which contains the tables of meteorological, magnetic, and seismic observations; since 1901 agricultural data have been added. The monthly bulletin has gone through several slight changes as to its name and contents, but is sufficiently described by its title. The annual volumes begin with the Report of the Director of the Philippine Weather Bureau for 1901–2. This includes: Part 1. The Climate of Baguio (Beguet). Manila, 1902. Part 2. Report of the Director of the Philippine Weather Bureau, 1902. Meteorological Service of the Philippine Islands. Manila, 1903. Part 3. Hourly Observations of Atmospheric Phenomena at the Manila Central Observatory, 1902. Manila, 1903.

It is probable that these three parts, although they receive independent paginations, are intended to form one volume and there is nothing to indicate but that a fourth part will be necessary in order to complete the volume for the official year 1901–2. This first volume, therefore, as far as received, consists of 74 pages devoted to the climate of Baguio; 68 pages devoted to the history of the meteorological service of the Philippine Islands from its establishment in 1865, under the Spanish Government, to its organization in May, 1901, under the Government of the United States, concluding with the legislation of 1902; and 147 pages devoted to the complete record of hourly observations taken during the year 1902 at the Central Observatory of Manila.

Such a complete publication as this of records for Manila and

Baguio is a very important contribution to the material at hand for climatological studies. Baguio is about 2° north and a little west of Manila. It was established as a health resort early in 1900.

Although, properly speaking, a valley on the summit of a large mountain surrounded by deep canyons, we consider the ground where Baguio is situated as a plateau, since the valley is formed by slight undulations, caused by moderately sloping hills, which almost surround it, and on account of its presenting all the characteristics assigned in climatology to elevated plateaus. The plateau occupies an area of 150 hectares. The approximate geographical coordinates are: Latitude 16° 32′ north; longitude 12° 35′ east of Greenwich. The meteorological station was founded by the United States Philippine Commission in the early part of the month of August, 1900. In May, 1901, the station was incorporated into the Philippine Weather Bureau as a first-class station and was equipped with better instruments. As an inferior station of the first class, we have taken the one established in Dagupan, distant from Baguio 32 miles south-southeast. A barometric determination of the altitude of Baguio above sea level gives 4777 feet as the result. The diurnal barometric movement is much less in Baguio than in Manila, by reason of its elevation. The hours of maximum and minimum seem to be very nearly the same. The annual variation at Baguio seems to be more complex than at Manila, as the annual curve shows four maxima and minima at the former, as compared with two at the latter. The monthly mean temperature at Baguio has its minimum, 62.1° F., in February, and its maximum, 70.5° F., in April. The relative humidity is a minimum, 74 per cent, in April, and a maximum, 93 per cent, in August. The number of foggy days is a minimum, 3, in April, but a maximum, 25, in August. The rainfall was a minimum, 0.06 inch, in January, but a maximum, 37.03 inch, in August, 1901.

The historical sketch of the meteorological service of the Philippine Islands, published as Part 2 of the Report for 1902, was written by Father Marcial Solá, Secretary of the Philippine Weather Bureau. We make the following synopsis from this exceedingly interesting historical summary relative to the oldest meteorological service in the Orient:

For a long time previous to the year 1865 the professors in the college at Manila (known as the Ateneo or Athenæum) had dedicated themselves to the study of predicting the existence and course of cyclonic storms; they were further stimulated in this work by the destructive typhoon which devastated the Island of Luzon in September of that year. The first Director of the Manila Observatory was the Rev. Federico Faura. After fourteen years of study he began to publish predictions of the approach and severity of typhoons or baguios, the first one being made on July 1, 1879. The brilliant success of this and other predictions gave an immense impetus to the study. During the four years, 1879–1882, 53 typhoons were predicted and not a single mistake was made as to the position of the storm. In two cases the storm spent its force before arriving at the threatened points. Meteorological observations were taken by telegraph operators by order of the inspector general, after December 7, 1878. In 1880, after a cable had been laid between Manila and Hongkong, the governor of the latter place, Mr. J. Hennessey, sent an official communication to the governor of the Philippines asking that a regular daily cablegram be forwarded to Hongkong, since it was evident that the gyratory storms that reached the coast of China were felt several days beforehand in the Philippines.

The study of the general climatology of the Philippines began to be agitated in 1877 by Father Faura, by securing the establishment of secondary stations throughout the archipelago. Finally, in 1881, the project of building up, not only a general service, but an important central observatory was indorsed and, by royal decree of April 28, 1884, from Spain, fully provided for. The complete text of this decree established a service, having Manila as its center, with 6 stations to the south, 3 on the west, and 4 on the northern coast of Luzon, all in telegraphic communication; it provided that other stations should be established as fast as the telegraphic system was extended; it also provided for the cooperation of the naval stations under the merchant marine at points not reached by telegraph. Before the middle of 1887 13 such stations had been fully equipped. The public was educated as to the general method of predicting typhoons by a pamphlet prepared by Father Faura and, especially, by the introduction of his barocyclonoscope, which consists of an aneroid barometer having extra indices so arranged that if one index points toward the wind the other will point toward the center of the storm, and a third shows the mariner which way to steer. Eventually, also, 21 third-class stations were established and all of these kept records of earthquakes as well as of meteorological phenomena.

While this progress was going on in the Philippines other services were being established at Hongkong, Zi-Ka-Wei, and Tokio, so that the whole of the western portion of the North Pacific began to come under the daily inspection of competent meteorologists.

In 1896 and 1897 the observatory took a distinguished part in the international year of cloud work, the results of which were published in 1899. In 1897 Father Algué published in Manila his theoretical and practical study of the Philippine baguios or typhoons; portions of this have been published in French and German; although Father Sola thinks that sometimes sufficient credit has not been given to Father Algué, yet, we hardly agree with him, seeing that all meteorological work has to be reprinted and worked over from different points of view, and, in general, it is sufficient to say that one's studies are based upon the great collection of data furnished by Fathers Faura and Algué. A very interesting episode occurred in 1899 when, at the request of the Director of the Meteorological Service at Hongkong, the American military authorities cut off the transmission of typhoon warnings to that place. This raised a storm of indignation in the latter station, the outcome of which was a complete vindication of the importance of the work that had been done in Manila and the speedy resumption of the storm warnings, which have continued to be sent since April 3 of that year, much to the gratification of all mariners. The memoir by Father Sola gives, among other things, a fine illustration of the Algué nephoscope, or the "refraction nephoscope," invented by him in 1900 and, apparently, now for the first time described. The installation of the observatory and its apparatus is quite ideal as regards meteorological conditions. The meteorological park consists of two small portions with a large garden belonging to the observatory. The ground is covered with grass and not flooded with rain during the wet season. Thermometers are exposed according to the several methods used by the Weather Bureau, by the Russian service, and by the Indian service. The Richard self-registering actinometer is kept in operation, as well as the one invented by Arago. But as these can not replace the exact work done with Violle's apparatus, it is to be hoped that the latter also may be added to this. A daily weather map is maintained for the archipelago and surrounding oceans, based upon 25 cable stations, in addition to the telegraphic reports from the Philippines. Since this report was published the American cables to Guam, Midway Island, and Manila have been finished, and we doubt not that these important outlying stations will be added. For these cable reports, and, we believe, for general use throughout the Philippines, an international time standard has been adopted, namely, that of the one hundred and twentieth meridian, or eight hours east of Greenwich. The exact longitude of the meridian of the observatory at Manila is 8h. 3m. 54.2s.

On May 22, 1901, the United States Commission to the Philippines enacted a law, which is published in full in the MONTHLY WEATHER REVIEW for 1901, p. 372, confirming the organization of the "Philippine Weather Bureau" and all the details of its work, its official staff, and its relation to the Government. Comparing all that is comprehended in this law with the services, above described, which the observatory had for many years been performing, it will be seen that scarcely anything has been altered as regards the amount and character of the work done. The Meteorological Weather Bureau of the Philippines comes directly under the local Secretary of the Interior, through whom it reports to the Governor of the Philippines and the Bureau of Insular Affairs at Washington. Since the reorganization, 1901, the number of reporting stations has been as follows: 1 central observatory; 9 first-class stations; 25 second-class; 17 third-class; 21 special rainfall stations. Three meteorological expeditions have been made for the installation of new stations and the inspection of old ones. The study of earthquakes and magnetics continues to be provided for in connection with meteorology. The first and second class stations make monthly reports. The cooperation of the Chief of the United States Weather Bureau is most heartily acknowledged. The report closes with a complete bibliography of the publications of the Philippine Weather Service and its predecessor, the Manilla Observatory.

LONG-RANGE FORECASTING.

In the official forecasts dated at 8 p. m. on Monday, November 2, Prof. E. B. Garriott says:

Observation has shown that periods of low barometric pressure over the British Isles are attended by stagnated weather conditions over the western Atlantic and the eastern part of the American Continent, and that five or six days after reestablishment of normal barometric pressures over the eastern Atlantic the usual progression of areas of high and low barometer over the United States is resumed. An instance of this kind has been presented during the past week. On Friday last an area of low barometer that had occupied the British Isles for several days began an eastward movement, and to-day the high barometer area that has persistently occupied the east-central part of the United States since last Tuesday shows signs of dissolution. The effect of these barometric changes will probably be shown in a gradual breaking up of the quiescent weather conditions that have prevailed since the 27th ultimo over the eastern part of the United States. There are at present, however, no indications of the development of a well-marked storm in the United States.

This interesting generalization and forecast is commented upon by Mr. James P. Hall editorially in the New York Tribune of November 5, as follows:

The most noteworthy thing about this statement is that it betrays a disposition to extend the range of Government forecasts beyond a period of twenty-four or thirty-six hours. It shows that some of the true principles of long-range work have been discovered and excites hope that in time it may be practicable to issue frequent intimations of the same character that will be thoroughly trustworthy. Should further experience verify the soundness of the particular statement here referred to, it will freshly illustrate the necessity of looking to the east, as well as to the west, in formulating opinions about coming weather.

In fact, experts will probably not get at the bottom of the whole matter until they discover the relations existing between conditions prevailing in America and continents as far distant as Asia and Australia. Whether the influences which disturb the atmosphere be simply thermal or include magnetic and other solar radiations, the effects should be widespread, if not universal. If the meteorologist can once discover only a part of any regular sequence of events, it may help him to find other members of the system.

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart IV and the average values and departures from normal are shown in Tables I and VI.

Two well-defined areas of high mean barometric pressure are shown by the isobars for the month. The principal one overlay the northern Plateau and northern part of the middle Plateau regions, with the crest, showing mean of 30.15 to 30.17 inches, over west-central Wyoming, southern Idaho, and eastern Oregon. The secondary area of high pressure overlay the northern portion of the east Gulf States, the Ohio Valley and Tennessee, northwestern Ohio, Indiana, Illinois generally, south-central Iowa, Missouri, Arkansas, and northern Louisiana, with the crest, bearing a mean of 30.15 inches of pressure, over central Tennessee.

The mean pressure was low over the southern Plateau regions and the valleys of California, with a minimum mean of 29.91 inches at Yuma.

The mean pressure diminished from that of the preceding month in the Atlantic States north of Georgia, and in the upper Ohio Valley, lower Lake region, and eastern portion of the upper Lake region; elsewhere there was an increase over September. The greatest decreases occurred on the middle Atlantic and southern New England coasts, and the greatest increases over the middle Plateau and southern portion of the northern Plateau regions. The maximum increases were .05 inch higher than the maximum decreases, and the area of increase was much greater than that of decrease.

The mean barometer was slightly below the normal in New England, the Middle Atlantic States, northern part of the South Atlantic States, eastern part of the lower Lake region, and in north-central California; elsewhere it was above the normal, and generally with departures greater than in the area over which the mean pressure was below the normal.

TEMPERATURE OF THE AIR.

The mean temperature was below the normal in the South Atlantic States, Florida Peninsula, west Gulf, and southern slope regions; normal in the east Gulf States and above normal in the remaining geographic districts.

Departures ranging from —1.1° to —1.3° per day were reported from the western portion of the Florida Peninsula, and from —1.3° to —1.8° per day over east-central and northeastern Texas; over the remainder of the area of minus departure the changes were slight.

As a rule the plus departures were marked, being an average of +1.0°, or more, per day generally over the northern two-thirds of the country; +2.0°, or more, per day over the northern half of the country, except the State of Washington; +4.0°, or more, per day in north-central upper Michigan, western Minnesota, the Dakotas, except southwestern South Dakota, central Nebraska, Montana, southwestern Idaho, and northeastern California, and +5.0°, or more, per day in central Montana.

The isotherm of 70° of mean temperature trends westward as far as longitude 100°, just to the southward of latitude 30°; it also incloses an area of slight extent over the southern Plateau region. The isotherm of 60° lay generally slightly to the northward of the thirty-fifth parallel as far west as longitude 105°, then southwestward to longitude 110°, and thence northwestward to northwestern California, and the isotherm of 50° generally slightly to the southward of latitude 45° westward to longitude 105°, then trends southward to central Arizona and thence northward over central Washington. An area of less than 50° of mean temperature overlay portions of the middle Plateau region.

Maximum temperatures of 90°, or higher, occurred in the central portion of the Florida Peninsula, in the east Gulf States except along the coast, the western parts of Tennessee and Kentucky, the interior of Louisiana generally, the interior of southeastern and the eastern portion of the panhandle of Texas, southeastern New Mexico, central Nebraska, the western portions of Kansas and Oklahoma, extreme southeastern Colorado, south-central and western Arizona, and California, except along the coast north of San Francisco and the extreme southwestern part.

Maximum temperatures of 80°, or higher, occurred, except in New England, the northern portion of the Middle Atlantic States, upper Lake region, except about southern Lake Michigan, Wisconsin generally, Minnesota, eastern South